REMARKS

In response to the above Office Action claims 1 and 8 have been amended to make it clear that the crystal is of an oxide of yttrium and that the microspheres are in the shape of a sphere. Claim 6 has been amended to include proper Markush language and claim 10 to correct a typographical error. Finally, claim 13 has been added to cover a preferred embodiment of the invention. Support for claim 13 can be found on page 8, line 4 of the specification.

The microsphere of the present invention is spherical. The sphericity of a microsphere obtained in the example was measured as an almost perfect sphere as described below.

In the following table, an average diameter is defined as an average value of diameters in four axial directions (including 0, 45, 90, and 135 degrees), the maximum diameter and the minimum diameter are defined as the maximum and the minimum among diameters measured in the four axial directions (actually measured on 25 microspheres prior to coating of SEM photographs with a ruler placed on the photographs). A deviation (%) was obtained according to an expression of "(maximum diameter - minimum diameter)/average diameter x 100."

Microsphere No.	Average Diameter (µm)	Maximum Diameter (µm)	Minimum Diameter (µm)	Deviation (%)
1	28.45	28.76	28.15	2.14
2	25.64	25.92	25.41	1.99
3	23.33	23.61	23.18	1.84
4	26.82	27.04	26.61	1.60
5	24.59	24.89	24.46	1.75
6	27.34	27.55	27.21	1.24
7	27.10	27.47	26.78	2.55
8	28.43	28.84	28.24	2.11
9	22.85	23.09	22.32	3.37
10	25.21	26.27	24.46	7.18
11	21.50	21.63	21.37	1.21
12	24.64	25.32	24.12	4.87
13	25.88	26.01	25.75	1.00
14	23.91	24.03	23.69	1.42
15	26.65	26.70	26.52	0.68
16	25.26	25.84	24.98	3.40
17	23.80	24.03	23.52	2.14
18	26.37	26.70	25.75	3.60
19	24.31	24.72	23.95	3.17
20	26.85	27.04	26.70	1.27
21	23.82	24.46	23.18	5.37
22	23.78	24.03	23.52	2.14
23	23.41	23.95	23.18	3.29
24	27.68	27.98	27.47	1.84
25	27.47	27.64	27.21	1.57

Because the microspheres of the present invention are spherical as described above, they are quickly sent to an affected region without stagnation in a catheter. Furthermore, since the microsphere is made of a crystal of an oxide of yttrium and is solid, the yttrium content in the microspheres per a unit volume is higher. Therefore, more radioactivity can be obtained with a smaller amount of microspheres.

The reason why a microsphere with a high sphericity is obtained in the present invention is that the raw inorganic material is melted with high frequency thermal

plasma. First, no cavity is generated since the raw material is an inorganic material. Second, in high frequency thermal plasma, the raw material can reside in the plasma for a long time and is thereby perfectly melted since the gas flow rate is from 15 to 25, m/s (See page 1201 of Pure & Appln. Chem., Vol. 57, No. 9, 1985, a copy of which is attached as Exhibit A). Furthermore, in high frequency thermal plasma, a high purity microsphere can be obtained since no electrode is used.

In the Office Action, the Examiner rejected claims 1, 2, 4, 5, 7, and 8 under 35 U.S.C. § 102(e) for being anticipated by U.S. Patent No. 5,885,547 to Gray. Claims 1-8 and 10-12 were also rejected under 35 U.S.C. § 103(a) for being obvious over Gray in view of U.S. Patent No. 5,302,369 to Day and U.S. Patent No. 5,073,404 to Huang.

In contrast with claims 1 and 8, the microspheres of Gray are actually not spherical, but hollow objects of an irregular shape as described, for example, in column 1, lines 8-10 as "hollow or cup-shaped." This is because the microspheres of Gray are produced by feeding a powdered based material with a suitable binder into a DC plasma torch. First, if the base material is heated together with an organic material such as a binder, a cavity is generated in company with burning off of the binder. Second, in DC plasma, the gas flow rate is fast (see page 259 of Plasma Chemistry and Plasma Processing, Vol. 2, No. 3, 1982 attached as Exhibit B). Therefore the residence time of a raw material is short, melting becomes incomplete and deformation occurs. Therefore, it is expected that such microspheres frequently become stagnated in a catheter. Furthermore, since the microspheres are hollow objects, the yttrium content in the microspheres per a unit volume is smaller than compared with microspheres of the

same diameters of the present invention. Moreover, in the case where a DC plasma is used, the material of the electrode is mixed into the microsphere as an impurity.

Accordingly, the microspheres of Gray may be of pure yttria (column 6, line 45), but since they are not of the same shape as applicants' microspheres, they cannot anticipate the noted claims. Withdrawal of Gray as a ground of rejection under §102 is requested.

Regarding Day, this reference may teach microspheres for radiation therapy containing yttrium that can be void-free and spherical in shape (column 5, lines 52-60), but these spheres are of a biologically compatible glass material containing the yttrium distributed uniformly thoroughly the glass. See column 2, lines 53-59. On the other hand, Gray requires that the hollow or cup-shaped microspheres be made of a ceramic material such as yttria. See column 3, line 55 to column 4, line 27 of Gray. Accordingly, it would not be obvious to one skilled in the art to make Gray's microspheres spherical in view of Day.

Moreover, Day equates void-free microspheres with microspheres having hollow cells for use in his invention (column 5, lines 52-53) with respect to their adequacy for use in radiation thereapy, so there is no suggestion in Day that the void-free microspheres would be superior to the hollow or cup-shaped microspheres of Gray for the reasons expressed above.

Day may disclose that yttrium can be incorporated into microspheres in combination with phosphorus and that they can be coated with additional coating materials, but the reference still does not teach what is missing in Gray, namely the microspheres comprising not less than 99% by weight of a crystal of an oxide of yttrium in the shape of a sphere.

Similarly, Huang may show the specific use of a silica film on glass microspheres, but his reference also fails to teach what is missing in Gray.

As noted in M.P.E.P. §2143, to establish a prima facie case of obviousness the references in combination must teach or suggest all of the claim limitations.

It is believed claims 1-8 and 10-13 are in condition for allowance and such action is therefore requested.

It is noted that the Examiner failed to cite the Huang patent (U.S. Patent No. 5,073,404) in the Form PTO-892 attached to the Office Action.

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: August 11, 2003

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Attachments: Pages 1197-1201 of Pure & Appln. Chem., Vol. 57, No. 9, 1985 (Exhibit A)

Pages 255-259 of Plasma Chemistry and Plasma Processing, Vol. 2, No. 3, 1982 (Exhibit B).